

### Trend Study 23-1-03

Study site name: Bear Ridge.

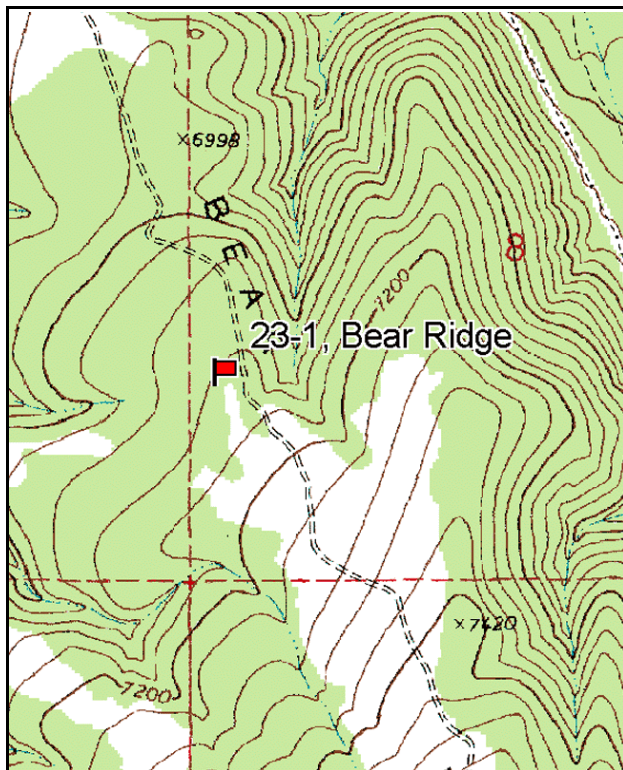
Vegetation type: Juniper-Pinyon.

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 1 on 1ft, belt 2 on 7ft.

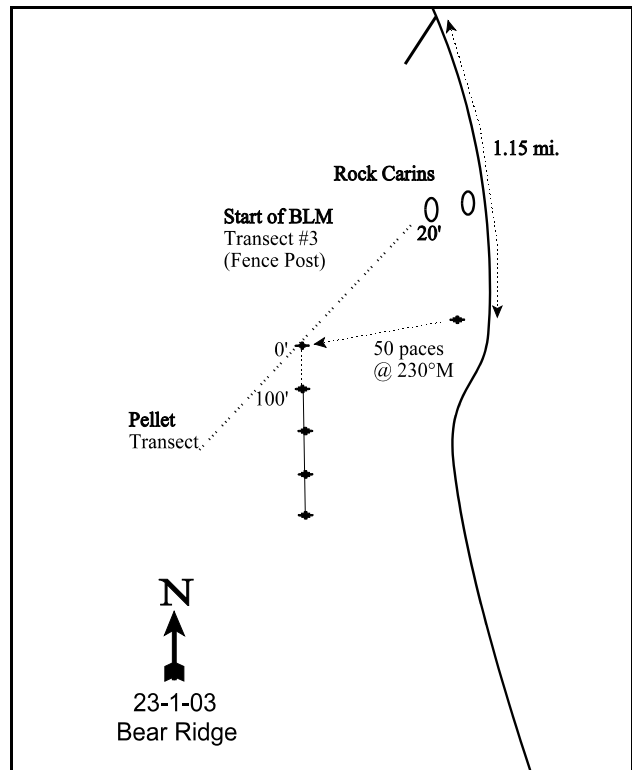
### LOCATION DESCRIPTION

From Richfield, go east on Highway 119 to the junction of U-24. One hundred yards before the intersection of Hwy 119 and U-24, turn south on a dirt road. Follow this road for 1.5 miles to a hairpin turn, keep right. Go 0.55 miles to a fork, bear left and go 1.15 miles more to a witness post on the west side of the road. Walk 50 paces at 230 degrees magnetic to the 0-foot baseline stake. The trend study stakes are rebar 2-1/2 feet tall, the 0-foot stake is marked by browse tag #7038.



Map Name: Water Creek Canyon

Township 24S, Range 1W, Section 8



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4287488 N, 418334 E

## DISCUSSION

### Bear Ridge - Trend Study No. 23-1

This trend study is located near the top of Bear Ridge. It has a gentle slope (5-10%) and a southwest aspect. The ridge is covered by a mature pinyon-juniper stand with a fairly abundant understory of shrubs and herbaceous vegetation. The 7,000 foot elevation is still within the limits of normal winter range. The range trend study samples the same area as the DWR Bell Rock pellet group transect. Counts from this pellet transect showed that deer use was relatively stable through 1985 with an average of 9 deer days use/acre (22 ddu/ha) (Jense et al. 1985). The average at that time was low when compared to data from the other pellet group transects in the unit. Deer use from 1985 to 1991 averaged almost 15 deer days use/ acre (36 ddu/ha) (Jense et al. 1991). There was no sign of elk use at that time. A pellet group transect read along the trend study site baseline in 1998 and 2003 estimated 52 and 54 deer days use/acre respectively (128 ddu/ha and 134 ddu/ha). A small amount of elk use was noted during both readings. Livestock grazing pressure appears to be light on this BLM land and no sign of cattle grazing was noted in 1998 or 2003.

The soil is covered by a layer of erosion pavement and rocks with small patches of bare soil exposed. Vegetation cover is abundant but consists mostly of shrub and tree canopy cover. Erosion is not a problem due to the gentle terrain. The erosion condition class was determined to be stable in 2003. Soil texture is a loam and neutral in reactivity (pH 7.3). Effective rooting depth is estimated at just over 11 inches with a moderately high soil temperature of 62° F (for this elevation) at almost 13 inches in depth in 2003. The amount of phosphorus in the soil is slightly low at 9 ppm, while percent organic matter is relatively high at 3.4%.

Pinyon and juniper trees are abundant and are beginning to effect the understory of shrubs and herbaceous species. Point-centered quarter data from 2003 estimated 197 juniper trees/acre with an average diameter of 7 inches and 119 pinyon trees/acre with an average diameter of 5 inches. Approximately 40% of the pinyon trees sampled were in the 4 to 8 foot height range while 45% of the juniper were over 12 feet in height. Line intercept canopy cover for pinyon and juniper trees was estimated at 32% in 2003. This high of a density and cover will decrease understory production.

Mountain big sagebrush, black sagebrush, and antelope bitterbrush are all important browse species on this site. Black sagebrush is the most abundant preferred browse species with a relatively stable density of 1,300 plants/acre in 1998 and 1,140 in 2003. Use was heavy in 1985 and 1991, but light to moderate in 1998 and 2003. The number of decadent plants was also high in 1985 and 1991, estimated at 53% and 77% of the population respectively. Percent decadence declined to 34% of the plants sampled in 1998, then increased to 53% in 2003. The population appears to be in a state of decline due to the lack of seedlings and young plants, combined with a high number of decadent plants. Drought and competition from pinyon and juniper trees is likely major driving force in this trend.

Mountain big sagebrush also appears to be in state of decline. Due to the shallow and rocky nature of the soil, this site is likely marginal for mountain big sagebrush. It has had a relatively stable density of around 1,200 plants/acre since 1985, but decadence has always been high averaging 62% between 1985 and 1998. However, reproduction appears to have been adequate to maintain the population up until 1998. Mountain big sagebrush density was estimated at only 840 plants/acre in 2003. Nearly 70% of the population was classified as decadent with 59% of those plants rated as dying (>50% crown death). No seedlings were encountered in 1998 or 2003, although young plants accounted for 9% and 14% of the population respectively. Poor vigor and decadence numbers are nearly identical to 1998. Annual leader growth for mountain big sagebrush was poor averaging only 1 inch in 2003. Utilization has remained light to moderate since 1991.

Bitterbrush occurs in smaller numbers, yet produced more cover than sagebrush in 2003. The average mature plant is around 2 feet in height with a crown diameter of 4 to 5 feet. Bitterbrush has received consistently moderate to heavy use since 1985, yet the plants have maintained good vigor. Annual leader growth was excellent in 2003, averaging 4 inches. Nearly one-third of the population was decadent in 1991, declining to only 8% in 1998. Decadence again increased in 2003 to 24%. Although recruitment was poor in 1998 and 2003, the population appears stable.

Herbaceous vegetation is not particularly abundant producing a cover value of 12% in 1998 and only 7% in 2003. Perennial grasses dominate the herbaceous composition. Large, vigorous bluebunch wheatgrass plants are most common. They have a high yield and good forage value on spring and early summer ranges. Sandberg bluegrass, bottlebrush squirreltail, and Indian ricegrass are also fairly common. Forbs are almost nonexistent on this site.

#### 1985 APPARENT TREND ASSESSMENT

The soil appears stable although vegetative conditions appear to be in a state of decline. The pinyon-juniper overstory is closing in and due to heavy use coupled with competition with the trees, there is little reproduction of the key browse species. Chaining and seeding would help restore the area, but treatment is not yet critical as forage production and erosion control are still within acceptable limits.

#### 1991 TREND ASSESSMENT

With the increase in bare ground from 10% to 15%, and percent cover for rock and pavement decreasing to 30%, the trend would be considered slightly down as vegetative basal cover is barely 6%. The key browse species, black sagebrush, mountain big sagebrush, and bitterbrush all show different stages of a downward trend. Black sagebrush didn't change much in density, but percent decadence went from 53% to 77%. Mountain big sagebrush lost 24% of its population with the proportion of the population classified as decadent also increasing. Bitterbrush density decreased by 13% and percent decadence increased to 29%. The herbaceous species show a slight upward trend for grasses and forbs. There are still very few forbs present on the site, although quadrat frequency and nested frequency values have increased for the most part.

##### TREND ASSESSMENT

soil - slightly downward (2)

browse - downward (1)

herbaceous understory - slightly upward (4)

#### 1998 TREND ASSESSMENT

The trend for soil is slightly downward again. Percent bare soil has increased to 21%. The ratio of protective cover to bare soil is also marginal. This site is basically becoming more dominated by juniper and pinyon and its effect on the understory species has been intensified by drought. The trend for browse is stable. Black sagebrush which contributes to 11% of the browse cover, displays improved vigor and lower decadence. Mountain big sagebrush (makes up 13% of the browse cover) has most of its measured parameters showing a stable trend, but overall health of the stand is poor. Currently, 68% of the population is dead with percent decadence remaining high at 67%. Bitterbrush, which provides 16% of the browse cover, shows some improvement. Utilization is lighter, vigor good and the number of decadent plants has declined from 29% in 1991 to 8% currently. The herbaceous understory trend is stable. Sum of nested frequency for perennial grasses and forbs remained similar to 1991. Nested frequency of the most abundant species, bluebunch wheatgrass declined significantly although other perennial grasses increased significantly. However, the herbaceous species still barely provide 12% total cover. Forbs are rare and contribute less than one percent cover and provide little cover or forage.

### TREND ASSESSMENT

soil - slightly downward (2)

browse - stable (3)

herbaceous understory - stable (3)

### 2003 TREND ASSESSMENT

Trend for soil has improved since 1998. Percent cover of bare ground has declined to 13%, while litter and vegetation cover have increased slightly. There is excellent protective ground cover to help prevent erosion. The erosion condition class was determined as stable in 2003. Trend for the key browse species is down slightly. Density has declined slightly for black and mountain big sagebrush while poor vigor and the number of decadent plants has increased. Recruitment remains poor. Bitterbrush is more stable but percent decadence has increased from 8% to 24%. Use was mostly heavy in 2003. The large difference in bitterbrush density between 1998 and 2003 appears to be due to a problem in differentiating between individual mature plants in 1998. Cover and strip frequency remained similar between 1998 and 2003, suggesting that the true population density is closer to the 420 plants/acre estimated in 2003. Trend for the herbaceous understory is stable but poor. Total herbaceous cover was estimated at only 7% in 2003. The most abundant grasses remained stable in nested frequency even though sum of nested frequency of perennial grasses declined slightly. Forbs are still rare.

### TREND ASSESSMENT

soil - up slightly (4)

browse - down slightly (2)

herbaceous understory - stable (3)

### HERBACEOUS TRENDS --

Management unit 23 , Study no: 1

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
G	Agropyron spicatum	<sub>b</sub> 227	<sub>b</sub> 227	<sub>a</sub> 183	<sub>a</sub> 160	7.78	5.59
G	Bromus tectorum (a)	-	-	<sub>b</sub> 42	<sub>a</sub> 15	.43	.03
G	Oryzopsis hymenoides	4	12	12	5	.17	.04
G	Poa fendleriana	<sub>a</sub> 6	<sub>bc</sub> 36	<sub>c</sub> 49	<sub>ab</sub> 24	.98	.46
G	Poa secunda	<sub>a</sub> 3	<sub>a</sub> 18	<sub>b</sub> 94	<sub>b</sub> 80	2.00	.94
G	Sitanion hystrix	<sub>c</sub> 25	<sub>bc</sub> 20	<sub>ab</sub> 6	<sub>a</sub> 2	.01	.01
Total for Annual Grasses		0	0	42	15	0.43	0.03
Total for Perennial Grasses		265	313	344	271	10.95	7.05
Total for Grasses		265	313	386	286	11.39	7.08
F	Agoseris glauca	<sub>a</sub> -	<sub>a</sub> 10	<sub>ab</sub> 1	<sub>a</sub> -	.00	-
F	Arabis spp.	<sub>a</sub> -	<sub>b</sub> 18	<sub>a</sub> 1	<sub>a</sub> 1	.00	.00
F	Astragalus convallarius	2	4	6	6	.15	.10
F	Calochortus nuttallii	4	8	-	-	-	-
F	Chaenactis douglasii	-	-	1	-	.03	-

T y p e	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
F	Comandra pallida	-	-	3	-	.03	-
F	Collinsia parviflora (a)	-	-	3	-	.00	-
F	Crepis acuminata	-	6	7	-	.06	-
F	Eriogonum racemosum	-	-	4	-	.03	-
F	Eriogonum umbellatum	<sub>a</sub> -	<sub>a</sub> 1	<sub>b</sub> 9	<sub>ab</sub> 5	.16	.07
F	Lomatium spp.	-	-	1	-	.00	-
F	Phlox austromontana	-	6	4	6	.16	.15
F	Physaria chambersii	1	4	-	-	-	-
F	Phlox longifolia	<sub>a</sub> 8	<sub>b</sub> 27	<sub>a</sub> 16	<sub>a</sub> 6	.20	.02
F	Unknown forb-perennial	3	1	-	-	-	-
Total for Annual Forbs		0	0	3	0	0.00	0
Total for Perennial Forbs		18	85	53	24	0.83	0.35
Total for Forbs		18	85	56	24	0.84	0.35

Values with different subscript letters are significantly different at alpha = 0.10

#### BROWSE TRENDS --

Management unit 23 , Study no: 1

T y p e	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Artemisia nova	35	26	2.24	2.41
B	Artemisia tridentata vaseyana	40	26	2.54	.76
B	Chrysothamnus depressus	1	0	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	1	0	.15	-
B	Gutierrezia sarothrae	2	0	-	-
B	Juniperus osteosperma	4	5	5.51	9.29
B	Opuntia spp.	1	2	.15	-
B	Pinus edulis	4	6	5.99	8.81
B	Purshia tridentata	18	15	3.20	4.31
Total for Browse		106	80	19.79	25.60

CANOPY COVER, LINE INTERCEPT --

Management unit 23 , Study no: 1

Species	Percent Cover	
	'98	'03
Artemisia nova	-	1.85
Artemisia tridentata vaseyana	-	.55
Juniperus osteosperma	7.19	23.31
Pinus edulis	2.59	8.94
Purshia tridentata	-	3.86

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 23 , Study no: 1

Species	Average leader growth (in)
	'03
Artemisia tridentata vaseyana	1.1
Purshia tridentata	4.0

POINT-QUARTER TREE DATA --

Management unit 23 , Study no: 1

Species	Trees per Acre	
	'98	'03
Juniperus osteosperma	213	197
Pinus edulis	115	119

Average diameter (in)	
'98	'03
8.8	7.0
4.8	5.3

BASIC COVER --

Management unit 23 , Study no: 1

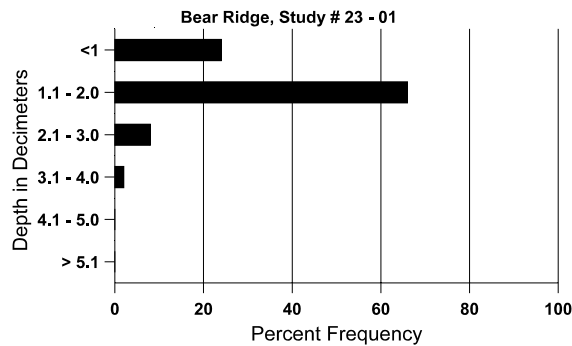
Cover Type	Average Cover %			
	'85	'91	'98	'03
Vegetation	2.00	5.75	30.04	32.50
Rock	6.00	5.25	11.18	13.20
Pavement	30.50	24.25	26.32	19.74
Litter	46.50	46.50	42.49	37.44
Cryptogams	5.00	3.00	.93	3.45
Bare Ground	10.00	15.25	21.42	13.10

# SOIL ANALYSIS DATA --

Management unit 23, Study no: 1, Study Name: Bear Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
11.2	62.3 (12.7)	7.3	40.0	33.4	26.6	3.4	9.0	57.6	0.5

## Stoniness Index



# PELLET GROUP DATA --

Management unit 23 , Study no: 1

Type	Quadrat Frequency		Days use/acre (ha)	
	'98	'03	'98	'03
Rabbit	25	32	-	-
Elk	4	-	7 (17)	1 (3)
Deer	36	20	51 (125)	54 (134)

# BROWSE CHARACTERISTICS --

Management unit 23 , Study no: 1

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<b>Artemisia nova</b>											
85	<b>2266</b>	133	200	866	1200	-	50	47	53	24	13/21
91	<b>2265</b>	66	66	466	1733	-	32	24	77	21	9/16
98	<b>1300</b>	-	80	780	440	860	49	0	34	9	16/23
03	<b>1140</b>	-	20	520	600	880	9	0	53	18	15/25
<b>Artemisia tridentata vaseyana</b>											
85	<b>1400</b>	266	200	400	800	-	67	24	57	14	13/15
91	<b>1065</b>	333	333	66	666	-	19	6	63	38	12/13
98	<b>1100</b>	-	100	260	740	2300	56	2	67	40	15/23
03	<b>840</b>	-	120	140	580	1740	29	0	69	40	14/21

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<b>Chrysothamnus depressus</b>											
85	0	-	-	-	-	-	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	-	0	-/-
98	20	-	-	20	-	-	0	0	-	0	-/-
03	0	-	-	-	-	-	0	0	-	0	-/-
<b>Chrysothamnus viscidiflorus viscidiflorus</b>											
85	400	-	200	200	-	-	0	0	-	0	12/11
91	0	-	-	-	-	-	0	0	-	0	-/-
98	20	-	-	20	-	-	0	0	-	0	10/12
03	0	-	-	-	-	-	0	0	-	0	-/-
<b>Gutierrezia sarothrae</b>											
85	0	-	-	-	-	-	0	0	-	0	-/-
91	66	-	66	-	-	-	0	0	-	0	-/-
98	40	-	-	40	-	-	0	0	-	0	9/9
03	0	-	-	-	-	-	0	0	-	0	6/5
<b>Juniperus osteosperma</b>											
85	266	66	66	200	-	-	0	0	-	0	69/64
91	333	66	133	200	-	-	20	40	-	20	152/98
98	80	40	40	40	-	-	0	0	-	0	-/-
03	100	-	60	40	-	-	0	0	-	0	-/-
<b>Opuntia spp.</b>											
85	0	-	-	-	-	-	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	-	0	-/-
98	60	20	40	20	-	-	0	0	-	0	8/12
03	40	-	-	40	-	-	0	0	-	0	6/14
<b>Pinus edulis</b>											
85	133	-	-	133	-	-	0	0	-	0	69/64
91	133	-	-	133	-	-	0	0	-	0	133/104
98	80	20	-	80	-	-	0	0	-	0	-/-
03	120	20	40	80	-	-	0	0	-	0	-/-
<b>Purshia tridentata</b>											
85	533	133	200	333	-	-	63	0	0	0	24/42
91	466	-	133	200	133	-	43	43	29	0	19/35
98	760	40	40	660	60	100	37	0	8	5	22/41
03	420	-	20	300	100	20	43	48	24	0	27/59



		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<i>Tetradymia canescens</i>											
85	<b>66</b>	-	-	66	-	-	100	0	-	0	7/4
91	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
98	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-